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# Environmental education during the COVID-19 pandemic: lessons from Ontario, Canada

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This study investigates the integration of place-based environmental education (PBEE) during emergency remote education (ERE) and in-person teaching, considering the implications of COVID-19. The objectives include (a) to understand if and how teachers used PBEE as a pedagogical learning tool during ERE, (b) to identify PBEE adaptations for implementation in an online context, and (c) to explore opportunities and barriers to PBEE during ERE. Ontario (Canada) educators' perspectives were obtained through an online survey and focus groups. Using non-parametric statistical analyses, perspectives concerning opportunities and challenges to integrating and delivering PBEE in lessons were identified. Additional focus included educators' views on student receptivity and knowledge retention. Findings indicate educators' appreciation for PBEE as a pedagogical approach, yet delivery challenges arise from systemic barriers causing inconsistency in PBEE delivery. Obstacles include curriculum demands, institutional disinvestment, grade-level constraints, and limited training. Despite challenges, educators showcase innovation and commitment to PBEE during ERE, emphasizing its enduring value. The study underscores educators' resourcefulness in adapting PBEE methods and the potential for renewed significance of outdoor education amidst the pandemic's influence on students' connection to nature.

KEYWORDS

**place-based environmental education, emergency remote education, teaching innovation, systemic barriers, COVID-19, Ontario**

## 1 Introduction

Environmental education (EE) can prepare youth to actively engage with local and global environmental concerns (Anderson, 2012; Omoogun et al., 2016). EE enhances understanding of environmental issues, awareness of natural systems, problem-solving skills, critical and systems thinking competence, and environmental stewardship (Ardoin et al., 2018; Yeşilyurt et al., 2020). For enhanced outcomes, EE can be complemented with experiential learning and direct contact with nature (Coertjens et al., 2010; Collado et al., 2020; Duerden and Witt, 2010). Place-based environmental education (PBEE) is experiential learning in the local environment based on matters concerning conditions, communities and cultures (Mannion and Adey, 2011; Smith, 2007; Woodhouse and Knapp, 2000; Yemini et al., 2023) and engages students with human impacts on biodiversity in their local context (Bodzin, 2008; Mannion and Adey, 2011).

Place-based environmental education often results in pro-environmental behavior and enhanced community connections when focused on local-scale comprehensible issues, which

may include mitigative actions (Anderson, 2012; Brody and Ryu, 2006; Schild, 2016). However, Prince (2020) demonstrated that government policies might need to emphasize outdoor learning, impacting teachers' PBEE training. Education policies often favor other curricula, limiting time and resources (Dyment, 2005; Prince, 2020; van Dijk-Wesselius et al., 2020). Teachers may need more confidence in delivering content outdoors, worry about student safety, and receive limited institutional support (Dyment, 2005; van Dijk-Wesselius et al., 2020; Yemini et al., 2023).

In Ontario, Canada, delivery of environmental themes across all subjects is often mandated (Buckler and Creech, 2014; Ontario Ministry of Education, 2023). This cross-curricular approach is supported in theory (Anderson, 2012; Lieberman and Hoody, 1998), but practical application often meets challenges. Reported issues include crowded curricula (Spence et al., 2013), absence of robust education policies (Glackin and King, 2020), scarcity of financial and professional development resources, and minimal leadership collaboration (The National Environmental Education Advisory Council, 2015).

Despite extensive reports to guide cross-curricular EE, governments have been criticized for not observing an interdisciplinary approach, resulting in a fragmented understanding of requirements (Bardecki and Mccarthy, 2020; Karrow et al., 2015; Mnyusiwalla et al., 2016; Pedretti and Nazir, 2014). Considering the value of EE and PBEE, support to overcome the barriers to classroom incorporation is essential.

Beyond systemic issues, novel environments can also distract students and result in educational challenges. Repeated exposure optimizes outdoor EE (Orion and Hofstein, 1994) as regular interaction with a place increases student focus (Falk, 1983). PBEE requiring organized field trips may not allow for observation of ongoing changes (Martin, 2003). However, using the school's surrounding environment (Biggs and Tap, 1986) may minimize the novel setting effect through continuous exposure (Crompton and Sellar, 1981; Martin, 2003). Outdoor EE can incorporate citizen and community science, where students can actively contribute to projects (Silvertown, 2009). Schuttler et al. (2019) indicate that outdoor CCS projects enhance student engagement more than comparative in-class activities.

In addition to these well-documented issues with successful PBEE, emergency remote education (ERE) was implemented during the COVID-19 pandemic. ERE has been implemented previously in times of crisis and is rarely based on robust pedagogical approaches (Bozkurt et al., 2020; Hodges et al., 2020). Challenges transitioning to ERE include implementing remote learning models and maintaining teacher-student connections (Shamir-Inbal and Blau, 2021). ERE dramatically increases the time required for lesson planning and learning new technology (Tawfik et al., 2021). However, some teachers report engaging with different methods or finding new collaborations, skills, and knowledge in their field (Bartalesi-Graf and Zamboni, 2020; Shamir-Inbal and Blau, 2021; Stickney, 2023). Others recognized their need for additional training (Trust and Whalen, 2021). Interestingly, during the COVID-19 pandemic, ERE altered PBEE as online and asynchronous education models changed the notion of "place" for educators and students (Stickney, 2023).

This study investigates the implications of alternating between emergency and non-emergency instruction and the delivery of PBEE during the COVID-19 pandemic. Specifically, this research asks: What are Ontario educators' perspectives on delivering place-based environmental education during regular in-person teaching and alternating between emergency and non-emergency learning? The study had three objectives: (a) to understand if and how teachers used PBEE as a pedagogical learning tool during ERE, (b) to identify PBEE adaptations for implementation in an online context, and (c) to explore opportunities and barriers to PBEE during ERE. We conducted an online survey to gauge teachers' perspectives and held focus groups for additional context.

## 2 Methodology

Teachers' perspectives on PBEE during regular in-person education and ERE were investigated using an explanatory sequential design (mixed-method approach) that started with collecting and analyzing quantitative data; qualitative data were then subsequently gathered to explain and interpret the quantitative results. Data were gathered through one online survey and eight small focus groups. The data collection procedures were modeled after other studies investigating barriers to PBEE (Dyment, 2005) and EE benefits (West, 2015). An online survey provided quantitative data through closed-ended questions, while open-ended thematic discussions gave qualitative results (Dillman et al., 2014; Ponto, 2015). Survey data helped broaden views regarding the research questions, and focus groups provided reasoning and examples for context (Leavy, 2023).

### 2.1 Participant recruitment

Participants were recruited using opportunistic (school board administrators provided teacher contact details) and snowball (study participants recommended additional participants) sampling. Mixed purposeful methods (a combination of data-gathering methods that involved an online survey and participant focus groups) were used to collect participant perspectives (Patton, 2014). Both permanent and occasional K-12 teachers from school boards in Ontario, Canada, participated. No prior knowledge of PBEE was required. Between January and May 2022, 3,306 study invitations were emailed, followed by an email reminder. The study description and invitation to participate were included in a TDSB online newsletter. This study was conducted when TDSB schools were in-person and at various stages of emergency protocol restrictions due to the COVID-19 pandemic.

### 2.2 Online survey and focus groups

The online survey was developed based on a review of the PBEE delivery and ERE literature and with an educational consultant from the TDSB. It was piloted with five arm's length research colleagues. Between January 24 and June 24, 2022, the online survey was administered through Google Forms. Survey questions required both ordinal and categorical responses relating to: (1) How do teachers typically deliver PBEE? (2) What barriers and opportunities are teachers faced with when delivering PBEE? and (3) What new barriers and opportunities have emerged for outdoor PBEE resulting from alternating between emergency and non-emergency teaching? After the online survey, participants were invited to join a focus group to elaborate on and discuss their perceptions through guided

conversations. Eight focus groups were conducted, consisting of three to five participants and the lead researcher. In total, 31 teachers participated in these focus groups.

## 2.3 Analysis

A Kendall's Tau-b test was used to investigate associations between ordinal survey responses, and a Mann–Whitney *U* test for associations between ordinal and binary answers (Agresti, 2006; Chen and Popovich, 2002; Field, 2017). Kendall's Tau-b test assesses the strength and direction of the association between two ordinal variables. It is beneficial for small sample sizes or when data do not meet the assumptions of parametric tests. The Mann–Whitney *U* test is a non-parametric method for comparing differences between independent groups. Where associations were found, the median frequency of PBEE delivery was determined. A 'not sure' response was excluded from the analysis. A paired-sample *t*-test (Wilcox, 2017) compared the frequency of PBEE during conventional in-person teaching and following emergency teaching protocols (ETP). An alpha value of 0.05 (95% confidence level) was the significance threshold for the statistical tests (Field, 2017).

Focus groups were audio recorded using Zoom software (Version: 5.11.0), transcribed, and organized using NVivo software (Release 1.3) (Leech and Onwuegbuzie, 2011) with a combination of inductive and deductive analysis of the data. The inductive approach coded data "without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions," to avoid researcher bias potential (Braun and Clarke, 2006, p. 83). The deductive approach relied on coding from previous research (Braun and Clarke, 2006). For example, barriers to PBEE were coded into themes: lack of training, school-level support and resources, overcrowded curricula, concerns about class management, and a lack of green space (based on research by van Dijk-Wesselius et al., 2020 and Dyment, 2005).

Themes were created by reviewing participants' responses to six focus group questions, including those from existing literature and others determined by the researchers. The transcripts were analyzed by running text searches of keywords, comprehensive reading, and coding participants' sentiments into themes (Leech and Onwuegbuzie, 2011). Coded references included the entire discussion point, regardless of keyword numbers related to a particular theme.

## 2.4 Study ethics

All participants provided their consent to join the study by completing a consent form approved by two independent ethics boards: one from the researchers' host university and one from the Toronto District School Board. All personal data were anonymized before analyses and destroyed after the project.

# 3 Results

The online survey response rate was 3.6% (122 responses from 3,306 invitations). Considering a population size of 16,260 K-12 teachers and assuming a minimum response bias, the first online survey had a margin of error of ±8.8%, 19 times out of 20.

## 3.1 Online survey

### 3.1.1 Section one: teacher details

Participants taught at the Toronto District School Board (TDSB, Canada's largest school board) (78%), other school boards in the Greater Toronto Area (17%), and other Ontario school boards (6%). Most had 10 or more years of teaching experience (73%), 14% had 5 to less than 10 years of experience, and 13% had less than 5 years. Most taught the elementary grade level (74%), while 26% taught high school, most commonly science, math, English, and the arts.

### 3.1.2 Section two: in-person delivery of PBEE

Teachers were asked how PBEE was delivered during in-person teaching before ETP. Survey participants reported including PBEE 'weekly/almost weekly' (33%) and 'once a month' (30%), while 19% indicated 'daily/almost daily.' Teachers specified that PBEE is 'very important' (82%) and 'somewhat important' (17%). They reported that PBEE learning 'significantly' (52%) or 'somewhat' (39%) increased student engagement. 9% indicated that PBEE had no benefit. The majority (71%) were confident in delivering PBEE.

### 3.1.3 Section three: barriers and opportunities for delivering PBEE during in-person teaching

Participants identified barriers and opportunities for PBEE during in-person teaching. Significant barriers were insufficient training and lack of preparation time. The most frequent opportunities were access to school ground green space and teachers' comfort managing students outdoors (Figure 1).

### 3.1.4 Section four: new barriers and opportunities for PBEE

A comparison in the frequency of PBEE delivery before and after the implementation of ETP shows a decrease in the most frequent users of PBEE and an increase in teachers who 'never' incorporated it. This finding indicates new barriers to PBEE. Figure 2 shows teachers' responses to how aspects of teaching and PBEE were affected. Student engagement in PBEE was positively affected. All other elements, including opportunities for PBEE and students' access to green space, were negatively affected.

## 3.2 Statistical analysis

Table 1 shows the results of Kendall's Tau-b test for association between frequency of PBEE delivery during in-person teaching (i.e., before ETP) and: (i) grade level, (ii) years of teaching experience, (iii) teachers' view of PBEE, (iv) student engagement in PBEE, and (v) teachers' confidence in delivering PBEE. A moderate, negative association exists between the frequency of PBEE and the grade level taught. The frequency of PBEE had a moderate, positive association with teachers' perceptions of its importance. Finally, there were strong, positive associations between PBEE frequency and student engagement in PBEE activities and with teachers' confidence in their delivery of PBEE.

Mann–Whitney *U* tests were conducted to determine differences in the reported frequency of PBEE classroom delivery, and survey respondents 'yes' or 'no' answers to (i) believing they received sufficient PBEE training (pre-service or in-service), (ii) viewing

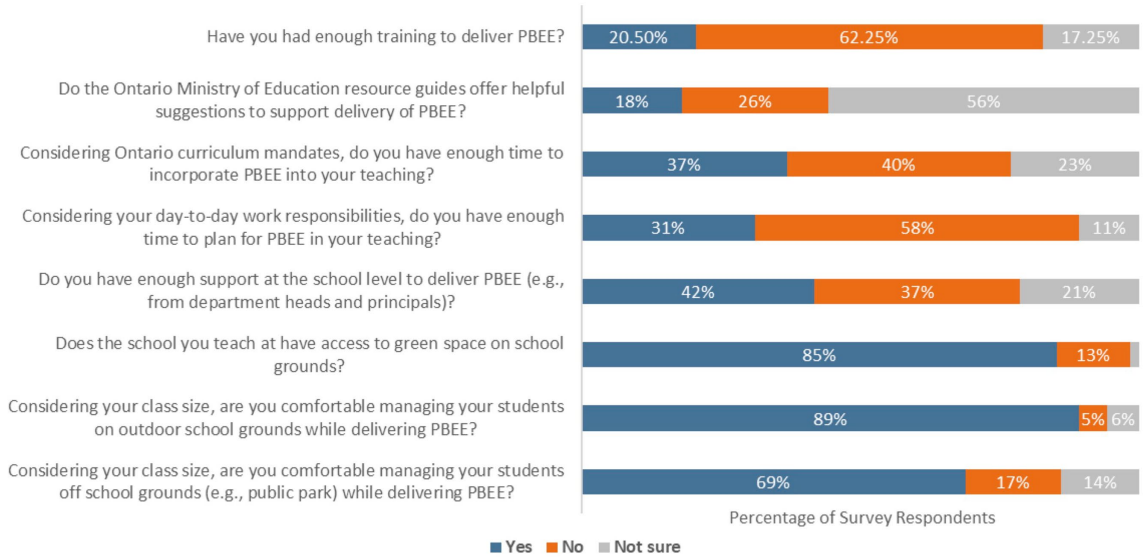


FIGURE 1
Survey responses regarding barriers and opportunities for delivering place-based environmental education (PBEE) during conventional, in-person teaching before the COVID-19 pandemic emergency protocols.

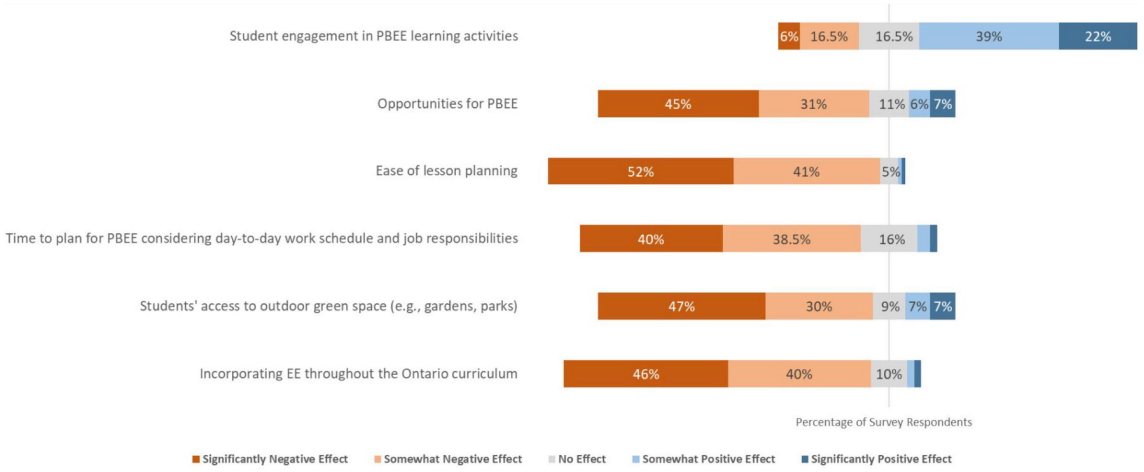


FIGURE 2
Survey responses regarding new barriers and opportunities for delivery of place-based environmental education (PBEE) since the COVID-19 pandemic emergency protocols (i.e., emergency remote teaching, and alternating between remote/virtual and in-person teaching). The graph shows the degree of negative and positive effects on different teaching factors, which are listed on the left side of this graph. Responses were adapted to provide a comparative overview of each question.

provincial EE resource guides (e.g., OME's *Environmental Education: Scope and Sequence of Expectations*) as helpful, (iii) having sufficient time for PBEE considering curriculum mandates, (iv) having sufficient time for PBEE considering their teaching schedule and other professional responsibilities, (v) having enough support from department heads and principals, (vi) having adequate access to green space on school grounds, (vii) being comfortable managing their class outdoors *on* school grounds, (viii) being comfortable *off* school grounds (Table 2).

Teachers who reported having sufficient PBEE training viewed resource guides as helpful, had enough time for PBEE, had school-level support to deliver PBEE, and were more likely to frequently include PBEE ('weekly/almost weekly') than teachers who responded negatively ('once a month'). With Kendall's Tau-b, a strong positive association was found between confidence in PBEE delivery and student engagement ($\tau_b = 0.372$, $p = <0.001$), and years of teaching experience had no association ($\tau_b = 0.341$, $p = 0.074$). When adequate training was reported, PBEE confidence level scores for 'yes' (mean rank = 71.82) were significantly higher than for 'no' (mean rank = 44.15), ($U = 1470.5$, $z = 4.323$, $p = <0.001$).

A paired-sample t-test comparing the frequency of PBEE delivery during in-person teaching ($M = 3.48$, $SD = 1.016$), and after the

TABLE 1 Kendall's Tau-b tests for association between frequency of PBEE delivery during in-person teaching and survey respondents' role, experience and perceptions.

| | *n* | *p* | Correlation coefficient |
|---|---|---|---|
| Grade level taught | 111 | 0.012 | −0.200* |
| Years of teaching experience | 116 | 0.151 | 0.113 |
| View about PBEE importance | 116 | 0.005 | 0.238** |
| Student engagement in PBEE | 115 | <0.001 | 0.376** |
| Confidence in PBEE delivery | 116 | <0.001 | 0.532** |

*Correlation is significant at the 0.05 level.
**Correlation is significant at the 0.01 level.

TABLE 2 Mann–Whitney U tests of differences in the reported frequency of in-person PBEE classroom delivery, and survey respondents' perceptions of preparedness, access to resources, administrative support, suitability of school grounds for environmental learning, and comfort teaching outdoors.

| | *n* | *U* | *z* | *p* |
|---|---|---|---|---|
| PBEE training | 96 | 1123.5 | 2.046 | 0.041* |
| View about provincial EE resources as helpful | 54 | 475.0 | 2.256 | 0.024* |
| Time for PBEE considering curriculum mandates | 91 | 1346.0 | 2.572 | 0.010* |
| Time for PBEE considering work schedule/responsibilities | 105 | 1774.0 | 3.6 | <0.001* |
| Support at school level | 94 | 1430.5 | 2.601 | 0.009* |
| Green space access on school grounds | 114 | 637.5 | −1.242 | 0.214 |
| Comfort managing class outdoors on school grounds | 109 | 398.5 | 1.235 | 0.217 |
| Comfort managing class outdoors off school grounds | 101 | 927.0 | 0.756 | 0.450 |

*$p < 0.05$.

implementation of ETP ($M = 3.18$, $SD = 1.17$), showed that the regularity of PBEE inclusion in lessons decreased ($M = 0.297$, 95% CI [0.143, 0.451], $t(100) = 3.819$, $p = <0.001$, $d = 0.38$). There was a moderate, positive association between PBEE delivery frequency and teacher perception of student engagement following ETP ($\tau_b = 0.268$, $p = 0.003$).

## 3.3 Focus groups

Common themes gathered from focus groups are summarized in Table 3. Overall, teachers identified more barriers (98) than opportunities (80) to the delivery of PBEE. Obstacles in the 'other' category were: (i) lack of collaboration within schools to facilitate PBEE events, (ii) students perceiving outdoor activities as uninteresting, and (iii) lack of respect for shared PBEE resources/tools, resulting in disorganized or damaged equipment. Opportunities in the 'other' category included (i) embracing seasonal changes in nature to enhance PBEE and (ii) incorporating PBEE early in the school year when the weather is warm to establish routines and expectations.

An equal number of references (51) cited new barriers and opportunities concerning PBEE delivery since the implementation of ETP. Obstacles in the 'other' category included: (i) difficulty incorporating PBEE during virtual teaching due to students' parents not being able to supervise outdoors, (ii) access to computers among students inhibiting virtual excursions, (iii) an administrative freeze on PBEE activities during ETP, and (iv) availability of weather appropriate clothing among students. New opportunities in the 'other' category included (i) teachers pursuing approaches to integrate PBEE across subject areas and (ii) school boards recognizing the necessity for outdoor education.

Teachers who felt the curriculum could better incorporate PBEE identified social sciences, physical education, and Indigenous studies as candidate subjects. Both elementary and secondary grades were referenced as levels where more PBEE could be integrated; kindergarten was not referenced. Teachers who believed all subjects could easily incorporate PBEE focused on kindergarten (eight references) and elementary school (eight references); high school was referenced twice.

# 4 Discussion

Our research delved into the views of K-12 EE educators in Ontario, examining their perceptions of the challenges and possibilities for delivering PBEE before and during the COVID-19 pandemic caused a shift to remote learning. Teachers provided insights from their perspectives and shared how students responded to PBEE in both situations.

## 4.1 Delivery of PBEE in Ontario schools pre-pandemic: barriers and opportunities

Pedretti et al. (2012) found that environmental content is taught by 92% of Ontario teachers. This indicates that educators value EE and its potential for interdisciplinary learning. Our research revealed that PBEE is widely used for in-person teaching, with 98% of respondents incorporating it in some form. However, about half of these respondents reported using PBEE daily or weekly, despite 82% recognizing its importance and 91% acknowledging it enhanced student engagement. While Ontario teachers value PBEE

TABLE 3 Barriers and opportunities to PBEE emerging from focus groups.

| Common themes | Number of references coded |
|---|---|
| Greatest barriers to PBEE | |
| Limited access to green space (i.e., due to lack of funding, neighborhood location, unfunctional schoolyard spaces) | 27 |
| Lack of time (i.e., teachers are already busy with curriculum expectations and planning for PBEE curriculum connections requires extra planning) | 18 |
| Insufficient training to deliver PBEE | 15 |
| Need for weather-appropriate clothing (i.e., students and teachers all need to be dressed for the outdoors) | 10 |
| Lack of administration, school, and school board support | 10 |
| Negative perception of outdoor learning (i.e., often viewed as free/play time rather than learning) | 7 |
| Sufficient supervision is not always available (i.e., the right ratio of adult to student ratio needs to be available when taking students off school grounds) | 6 |
| Other | 4 |
| New barriers to PBEE since the implementation of COVID-19 pandemic ETP | |
| Less access to green space | 21 |
| Hybrid and remote/virtual learning presented technical and logistical issues | 6 |
| ETP required more planning by teachers | 5 |
| Low student engagement | 5 |
| Difficult student behavior after a return from remote/virtual learning | 5 |
| Hybrid and remote/virtual teaching has been taxing on teachers | 3 |
| Other | 6 |
| Greatest opportunities for PBEE | |
| Teachers' personal interests and values (i.e., teachers' importance of experiential or outdoor education, willingness to do extra planning, and personal research) | |
| Access to green space | 21 |
| Administration, school, and school board support | 12 |
| Access to external PBEE organizations and field trips | 9 |
| Access to supplementary tools to support PBEE | 9 |
| Availability of PBEE training for teachers | 7 |
| High student engagement | 5 |
| Support from outdoor education teachers | 5 |
| Other | 3 |
| New opportunities since the implementation of COVID-19 pandemic ETP | |
| Technology helped facilitate EE (i.e., through virtual excursions and exposure to new places that may not be accessible otherwise) | 12 |
| Increase in teachers' creativity | 10 |
| Increase in resources (i.e., more access to external PBEE groups and organizations) | 9 |
| New appreciation for green space (i.e., from students and teachers) | 8 |
| Outdoors perceived as a safe place (i.e., related to the COVID-19 pandemic) | 7 |
| PBEE as support for mental health | 5 |
| Increase in administration support | 3 |
| Other | 2 |
| PBEE across the curriculum | |
| View that *certain* subjects incorporate PBEE more easily | 46 |
| View that *all* subjects easily incorporate PBEE | 18 |
| Expectations of new/unfamiliar ICT | |
| Internet capability and Wi-Fi | 22 |

*(Continued)*

TABLE 3 (Continued)

| Common themes | Number of references coded |
|---|---|
| ICT training | 16 |
| User-friendly ICT (i.e., related to intuitive use/interface and visual guides for students, including English language learners) | 14 |
| Easy sign-in (i.e., option to sign in through students' school accounts, compatibility with other technology) | 5 |
| Engaging for students | 4 |
| ICT use in teaching PBEE | |
| Makes PBEE easier (i.e., positive student response, provides a tool to support outdoor lessons) | 80 |
| Makes PBEE more challenging (i.e., difficulties managing technology outdoors, access to technology and internet not always available, requires additional planning) | 53 |
| Preference to limit technology (i.e., ICT use should be mindful, teachers prefer to get students to interact with the environment without the distraction of technology) | 24 |
| Student engagement in PBEE while teaching with ICT | |
| Increased engagement (i.e., ICT is an instant buy-in for students, allows for creativity and collaboration, helps students feel ownership over their contribution) | 30 |
| Decreased engagement (i.e., excess of technology during virtual teaching resulted in apathy, personal devices can provide many distractions) | 7 |

as a practical delivery approach, systemic barriers hinder implementation.

The negative association between PBEE frequency and grade level taught highlights potential obstacles and curriculum demands in senior grades. This is important concerning the Ontario provincial EE resource guide, which connects the environment to various high school subjects. Integrating EE may be more feasible at the elementary level, where a single teacher is responsible for core subjects (Bardecki and Mccarthy, 2020; Mnyusiwalla et al., 2016). One elementary teacher shared, "We do not teach social science independently, or social studies or science; everything is integrated with language and math." Another kindergarten teacher added that PBEE can be seamlessly incorporated into any strand of the kindergarten curriculum.

In focus groups, most elementary teachers expressed that outdoor learning activities significantly increase student engagement and are an excellent opportunity for PBEE. Teachers noted that students deeply engage in the experience and eagerly absorb new information. These findings align with Dring et al. (2020) and Lieberman and Hoody (1998).

Environmental education increases the engagement and performance of female students in secondary science classes (Stevenson et al., 2021). Although not explicitly investigated here, the decreased frequency of PBEE teaching as grade level increases may contribute to a decline in girls' involvement in secondary STEM courses, as reported by Patterson et al. (2017). Therefore, the potential for PBEE enhancing engagement in female secondary students in STEM courses may be a future line of inquiry.

Focus group participants felt overwhelmed managing external factors in the outdoor environment. Most, especially secondary school teachers, believe they require special training to deliver EE effectively. Several suggested they needed more knowledge of local environmental topics or to familiarize themselves with the neighborhood they taught in. Similarly, Magntorn and Hellen (2006) found that more training is needed for outdoor education. Approximately 20% of our participants felt they had enough training to provide PBEE. All others said they did not or were unsure if they did. One focus group participant shared:

> There [are] many teachers who, if they feel they are not experts in a subject, are afraid to teach it. […] We, as teachers, get very little to no resources in general, let alone about this specifically. I cannot remember getting anything ever about this to help with my teaching….

While Ontario teacher resource guides identify EE curriculum expectations (Ontario Ministry of Education, 2017a, 2017b) and provide strategies to incorporate them in the curricula, there needed to be more time for PBEE, one of the most common barriers discussed in all focus groups. One teacher explained that it is easy to forget to incorporate outdoor education when planning lessons, so having lesson plans in the curriculum would be helpful. Teachers in some schools reported having 40-min classes, which meant that outdoor activities were not feasible.

Teachers need help implementing EE due to oversaturated curricula and a need for more support. Pedretti et al. (2012) reported that teachers need more curriculum resources to align EE with official expectations. Similarly, Rickinson et al. (2004) found that curricular demands often prioritize other expectations over outdoor education. Studies indicate that emphasis on core subjects and standardized testing leaves little room for outdoor learning (Dyment, 2005; Magntorn and Hellen, 2006; Mnyusiwalla et al., 2016; Prince, 2020).

Dring et al. (2020) found that teachers need more EE support at the school level in BC, Canada. They identified that administrators often need to consider EE as a curriculum-aligned subject. In our survey, 42% of teachers reported supportive administration for EE, 37% did not, and 21% were unsure. Institutional support for PBEE delivery was discussed as an opportunity, with administrators' encouragement, and a barrier, with administrators' resistance. All focus groups identified paperwork as a significant barrier to incorporating PBEE.

The increasing societal discourse about climate change may result in greater support for PBEE. Some of our participants identified opportunities arising from a change in institutional support. One participant shared that their school now offers outdoor education programs facilitated by experts from local conservation authorities,

taking students to a nearby park for PBEE activities. This type of support can be transformative:

> The opportunity now is that our school board is pretty behind in alternative ways of learning, alternative ways of knowing, and using spaces in different ways, whether that's outdoor education or outdoor classrooms. I think that opportunity is really cool because they are putting funding there. They are getting administrators to approve things like that and looking for ways to engage otherwise disengaged students.

Many teachers with personal environmental concerns are motivated to engage their students in PBEE. Our survey showed that these teachers research and plan PBEE in their classrooms. They also discussed environmental education in their training, seeking additional courses, tools, and resources, collaborating with outdoor education centers and external PBEE-based organizations, and starting their initiatives to promote PBEE.

## 4.2 Emergency teaching protocols and their impact on PBEE delivery in Ontario schools

According to both survey and focus group results, the delivery of PBEE decreased with the implementation of ETP. The primary obstacle was the inability to access green spaces. Many teachers in the study taught in urban areas and reported that students often lived without easy access to a backyard or nearby natural spaces. One teacher explained:

> I have had students who live in super tall apartments and cannot leave because their family is so stressed about COVID. I have tried to suggest [to] go outside on our break, and they [say] "I am not allowed outside." So, it has been tough to find something equitable to participate in.

Teachers indicated that creating remote learning PBEE exercises in which all students could participate was challenging when interfacing with families with multiple children and parents with work responsibilities, as well as elevated COVID-19 concerns in outdoor urban areas.

Teachers shared challenges with transitioning to online teaching, including the time requirements to create new teaching materials and navigate ETP. According to Barfod (2023), some teachers also require more preparation time for outdoor learning. During ERE, technical and logistical issues in PBEE included coordinating outdoor activities during hybrid teaching and the risk of Wi-Fi interruption. Additionally, participants reported that special education students required additional guidance for navigating technology, making PBEE less feasible.

Trust and Whalen (2021) reported mixed perceptions among teachers regarding school administrators' attitudes toward PBEE during the pandemic. Some thought administrators were helpful, while others felt they needed more precise communication and leadership skills. Our study found that teachers viewed administration support for PBEE during ERT positively. Participants believed this was due to increased professional development resources supporting emergency teaching and some administrators becoming more open to outdoor learning.

Maintaining students' attention was the biggest challenge across all subjects during ERE. A high school teacher shared his experience, stating that it is difficult to know whether students follow through, even if he pushes them to leave their computers. Research conducted by Boltz et al. (2021) and Tawfik et al. (2021) also revealed concerns about student accountability during online learning. Hysaj (2021) noted low student engagement and difficulties managing online classes. In contrast, 61% of surveyed teachers reported increased engagement in PBEE activities during online learning. This result is surprising, given the challenges mentioned earlier. We attribute this to the resourcefulness of teachers who found innovative ways to incorporate PBEE activities—for instance, taking students on virtual field trips, leveraging external environmental organizations, and encouraging students to explore the outdoors and share findings with their class.

During discussions about returning to in-person teaching, participants noted that their school community now perceives the outdoors as safer than indoors compared to the pandemic's beginning. Teachers were more prepared to spend time outdoors, and parents dressed their children more appropriately for outdoor weather. These findings indicate the powerful potential of PBEE to help children form connections with the natural world, their communities, and the cultures around them, corroborating the work of other researchers (Irvin et al., 2019; Yemini et al., 2023; Ellington and Prado, 2024).

Participants from urbanized areas reported needing more green spaces to hold classes or experienced a lack of schoolyard spaces, which required better maintenance or more vegetation. These realizations have encouraged conversations about revitalizing school grounds. Participants noted renewed enthusiasm among students for spending time outdoors, especially those who live in high-rise buildings. While some teachers reported inequitable access to the outdoors, many recognized the value of being in nature for student wellness. They possessed a desire to work harder to reduce barriers for marginalized students. Moreover, several teachers explained that post-pandemic, it has become socially acceptable to spend as much time outside as possible to benefit students. Similar benefits of PBEE in urban communities, specifically with BIPOC students, have been reported by Ellington and Prado (2024).

Researchers in the present study noted that K-12 education is a highly diverse learning space and that teachers' experiences at either end of the student age spectrum may not be comparable. Future research using studies with larger samplings from both groups of teachers into the differing benefits, rewards, and challenges of PBEE in elementary versus secondary schools during ERE may be insightful for educators, especially in preparation for future emergency situations.

# 5 Conclusion

This investigation sheds light on the challenges faced by K-12 educators in Ontario, Canada, in implementing EE and PBEE in ordinary and extraordinary circumstances. The study found that teachers perceive barriers to PBEE differently; what one teacher considers an obstacle is another's opportunity. The availability of green

spaces and administrative support were particularly contentious issues. The research emphasizes the importance of consistent delivery of EE, whether in-person or remote, as required by the shift to ERE during the COVID-19 pandemic.

The study also reveals that educators broadly acknowledge the value of PBEE, especially in urban settings, where there is an increased need for natural spaces and hands-on environmental learning. This, coupled with a growing recognition of climate change, suggests a shift toward greater institutional support for outdoor education and schoolyards with more dynamic, green spaces. Such a shift could lead to reevaluating EE's importance within the broader academic curricula and environmental stewardship scope.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by Toronto Metropolitan University Research Ethics Board (Ref# REB 2019–003) and Toronto District School Board (Ref# 2018–2019-46). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

AM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. IB: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. NB: Investigation, Methodology, Writing – review & editing. GL: Investigation, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



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